

EXPEDITED PROCEDURE EXAMINING GROUP: 1797

Docket: 14505.01

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor:	Matthew Dugas	Confirmation No.: 9823
Appln. No.:	10/685,289	Examiner: Siefke, Samuel P.
Filing Date:	October 14, 2003	Group Art Unit: 1797
Title:	SOLID STATE MEMBRANE CHANNEL DEVICE FOR THE MEASUREMENT AND CHARACTERIZATION OF ATOMIC AND MOLECULAR SIZED SAMPLES	

**DECLARATION UNDER 37 C.F.R. § 1.132 TO OVERCOME
CLAIM REJECTIONS UNDER 35 U.S.C. § 102(e)**

**Mail Stop RCE
Commissioner for Patents
P.O. Box 1450
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I, Gregory T. Cibuzar, hereby declare that:

1. I have a Bachelor degree in Physics from Carleton College, Minnesota, and a Masters degree and a Ph.D. in Physics from Brown University, Rhode Island. From 1990 to the present, I have presided as the Laboratory Manager of the Nanofabrication Center (formerly the Microtechnology Laboratory) of the University of Minnesota, Institute of Technology. From 1998 to the present I have been an adjunct professor in the Department of Electrical and Computer Engineering at the University of Minnesota, Institute of Technology.

2. Prior to joining the University of Minnesota, I served in a variety of industry positions, including Principal Research Engineer at Unisys Corporation in Minnesota and Senior Research Engineer at Sperry Corporation in Minnesota.

3. I served as the General Chair of the 1999 IEEE University/Government/Industry Microelectronics (UGIM) Symposium and a Technical Committee member for both the 2001 and 2003 IEEE UGIM Symposiums.

4. My research at the University of Minnesota focuses on microelectronics and Micro-Electro-Mechanical Systems (MEMS), and particularly focuses on design and process development, including microfluidic structures, pressure sensors, high aspect ratio structures, low stress LPCVD films, compound semiconductor processing and ohmic contact formation, and dry etching processes related to silicon and compound semiconductor films.

5. Based on my background, I have been retained to describe the differences between electron beam milling and electron beam lithography as understood by one skilled in the art.

6. Contrary to the Examiner's assertions, electron beam lithography is different than electron beam milling.

7. In micro-fabrication and nanofabrication, "lithography" refers to techniques and methods used to create a pattern in a film that has been added to the surface of an object. As a specific and common example, a liquid polymer material (photoresist) that reacts with specific wavelengths of light can be deposited onto a flat surface of a substrate using spin coating techniques. Selective areas of the photoresist are exposed to light of the proper wavelengths; these areas of exposed photoresist are chemically modified and can be removed in a chemical solution, with the unexposed photoresist remaining on the surface. By controlling the areas of photoresist that are exposed, specific patterns can be created. That is, the patterns are in the layer of photoresist that is lying on top of the substrate surface. This layer of photoresist is used only as a pattern for subsequent processing, such as etching or deposition, which will change the surface of the substrate in the regions where the photoresist has been removed. After the subsequent process step is completed, the photoresist on the surface is removed. Thus, lithographic processing does not change or modify the substrate directly, but involves the patterning of an intermediary (e.g., photoresist) which then serves to protect the surface from the effects of a subsequent process, such as etching or deposition.

8. Electron beam lithography specifically refers to lithographic patterning using a beam of electrons to expose the photoresist. Electron beam lithography systems create beams of electrons with accelerating voltages in the range of 10 to 100 kilovolts (KV). These accelerating voltages are sufficient to chemically modify the photoresist, but not high enough to cause changes to the surface of the substrate. Electron beam lithography systems are generally based on scanning electron microscope (SEM) technology, a well-known materials and surface characterization method. In electron beam lithography, the beam of electrons takes on the role that light plays in traditional lithography.

9. In contrast, in micro-fabrication, "milling" refers to processes specifically designed to remove material from the surface of a substrate using a physical mechanism (as opposed to a chemical mechanism). High energy particles, such as argon or gallium atoms, or electrons can be used to perform milling. Milling effectiveness is directly related to the momentum of the particles. Momentum is defined as mass times velocity; using electrons for milling requires very high energy electron accelerating voltages – over 100KV. Creation of a beam of electrons with this high accelerating voltage can be accomplished with a transmission electron microscope (TEM).

10. An electron beam lithography system does not have sufficient accelerating voltage to cause milling of the surface.

11. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code and that willful false statements may jeopardize the validity of the application or any patent issued thereon.

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